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NORTH DAKOTA LIFE: PLANT, ANIMAL, AND HUMAN.

BY

WALLACE CRAIG.

PART II.*

3. ADAPTATIONS IN BIRD-LIFE.

(3a) *Flatness.* The propensity to travel, common to all the living inhabitants of flat countries, and already illustrated by the seed dispersal of prairie plants, is exhibited again in the exceptional powers of flight of the great majority of prairie birds. The minority of prairie birds, which feel safer when hiding in the grass than when flying, will be treated in the following section (3b). The great majority of prairie birds take wing readily, fly with ease and velocity, and are capable of sustaining and protracting their flight over great distances. The prairie birds are not distinguished, in this fact of superior flight, from the birds which fly over other plain surfaces, such as the ocean, the marsh, and the desert, for the birds of all these plain regions are equally strong fliers; but the plains birds are distinguished from the arboreal birds, which are much poorer fliers. It is granted that certain highly volitant birds, notably the birds of prey, are common to forest and prairie; but these are accustomed, when in a forested region, to make protracted flights above the tree-tops, and it is obvious that under such circumstances the forest becomes to them an unobstructed plain, not essentially different from a prairie. Birds, on the other hand, which fly among, but not over, the tree-tops, never leave the forest for the prairie, and they show in all cases less-powerful, less-sustained flight than their relatives on the plains; such are the whippoorwill, less volitant brother of the nighthawk; the blue-jay, similarly related to the crow; and the vireos, as against the swallows. But the extreme of this contrast may be drawn between the lumbering flycatchers, which return to rest on a tree after catching each fly, and the unflagging swifts, which, if only they can find on the prairie a chimney to hold their nests, need no other resting-place in their miles and miles of circling flight.†

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*Concluded from p. 332.

† The flycatchers and the swifts are not related by blood, and are therefore not comparable in the same sense as the other groups mentioned; yet I think it is eminently fair to contrast them, because they are similar ecologically, they fill closely analogous positions in the economy respectively of the forest and of the prairie.

Highly volitant birds flying over a uniform plain tend to gather in multitudinous flocks. Every prairie-dweller is familiar with the long, loose flocks of gulls and terns, the serried flocks of geese and ducks, the massed flocks of sandpipers and plovers. That large flocks are characteristic of the open plain, and that they are not favoured by arboreal life, may be seen by contrasting, in this respect, the prairie-hen and the ruffed grouse, the nighthawk and the whip-poorwill, the crow and the blue-jay, the blackbirds and the orioles, the longspurs and the cardinal or the indigo-bird.

The highest development of the power of flight is seen in the habit of singing (or making other display) on the wing. This habit is virtually restricted to birds of the open. The renowned sky-lark of England is famous because it is, for England, unique. Gilbert White says,* "Birds that sing as they fly are but few," and he gives a list of seven, most of which sing on the wing only, as it were, by inadvertence. In contrast to this meagre list for England, singing on the wing is practised in some degree by every one of the highly volitant songsters of the prairie, and observers there will be able to add new names to the following list of eight birds, all common in the Dakotas, which not only sing while flying, but have developed flight-song to a very high pitch of facility, beauty, and expressiveness. The eight birds are the horned lark, bobolink, Smith's longspur, chestnut-collared longspur, lark-sparrow, lark-bunting, purple martin, and Sprague's pipit. When the males of these species soar and send forth their music from a height, they must be heard by the females for a long distance; this fact foretokens other examples of long-distance perception in the mammals and the men of the plains.

It has already been mentioned, and it is so obviously necessary as scarcely to need mention, that prairie birds are adroit in walking and running. Now, just as volitant bird-life attains its highest expression in the habit of singing on the wing, so it may be said that cursorial bird-life attains its highest expression in those concerted dances, mock-battles, and displays, which have excited the wonder and admiration of all naturalists. Among such performances, that of our own prairie-hen has been accorded a very high rank, both because the performance itself is an elaborate one in which several cock-birds take part, and because the birds have unique features even in their form and structure, which are for no other purpose than this display.†

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* Gilbert White, Natural History of Selborne, Letter II. to Hon. Daines Barrington.

† See Darwin's Descent of Man, and Wilson's American Ornithology; under "Pinnated Grouse."

(3b) *Aridity.* In the transition from forest to prairie, as we have already seen, the high-flying birds which sail over the tree-tops of the East, sail over the grass of the prairie with but little concern for the change. We may now ask what becomes of those comparatively weak-flying forest birds which swarm below the tree-tops, thronging the foliage, the tree-trunks, the undergrowth, and the ground. The fact is that all of these species, with perhaps not a single exception, penetrate into the prairie region in narrow lines along the wooded or thicketed river-valleys; indeed, the tapering valleys seem to act, especially during migration, as funnels, concentrating the birds into narrow strips of wood until the trees become thronged even more fully than the trees of the East. The thrushes and warblers, the rose-breasted grosbeaks and orioles which thus throng the woods of the valley, never stray across the boundary-line of their narrow and isolated precinct. Even the Harris sparrow, though it abounds, in season, in every thicket in every river-valley that crosses the plains, and though it has never been seen beyond the confines of the plains region, clings, nevertheless, to its coppices and little clumps of bushes and sedulously avoids the great open plain. The strong contrast and sharp delimitation of valley and plain is, in all its phases, one of the most interesting phenomena in North Dakota; but in no other case is it quite so surprising as in the case of the birds.

The birds of the plains proper must, all of them, except a few that now build on houses, descend to the ground, or even into the ground, to nest. They thus follow the subsidence of the flora which we noted before (2b). The owls of the woods nest in hollow trees; the owls of the plains nest in burrows. Flickers in the forest dig their nest-holes in trees; flickers on the plains dig their nest-holes in the ground. The oriole hangs its nest on the most inaccessible twig of a tall tree; its relative, the meadow lark, finds almost equal security in the concealment of the prairie sod.

A few prairie birds not only conceal their nests in the grass, but at every alarm conceal themselves there also. These constitute the minority of prairie birds, briefly referred to above, which feel safer when hiding in the grass than when flying over it. Such are the various birds known to the country boy as "ground birds," including the vesper-sparrow, savanna sparrow, and others. These contrast strongly with the highly volitant birds described in the last section (3a); but it is obvious, as has just been said, that even the most volitant of prairie birds must come to earth sometimes. There is indeed a great contrast between the vesper-sparrow, which hardly dares to fly, and the nighthawk, which is hardly able to walk; yet both nest on the ground.

An interesting adaptation to life in a semi-arid country, one which will be further illustrated among the mammals, is the ability to live without drinking. The prairie-hen apparently never drinks any water but the dew; Wilson* tells that a captive bird of this species avoided all standing water, but eagerly drank drops which trickled down the bars of its cage.

Another adaptation to the semi-arid country, one which, again, is common to birds and mammals, is pallid coloration. Proceeding from the dark forms of the moist sea-coasts to the pallid forms of the desert, a regular, continuous lightening may be observed. The uniformity of the lightening suggests that it is purely mechanical,† a mere sun-bleaching perhaps; nevertheless, the light colors of the birds of the plains are useful for concealment on the pale, dusty soil and the whitish herbage.

(3c) *Severe Winter.* The winter birds are fewer in the Northwest than in other parts of the country. Migration is, among the prairie birds, well-nigh universal. The severe cold and the almost complete suspension of life in the flora and the insect-fauna, are unusual incentives to migration. The powerful, protracted flight of plains birds enables them (*e. g.*, golden plover) to migrate farther, on the average, than other birds. In all respects the plains offer exceptional facilities for the study of the marvelous and imperfectly understood phenomenon of bird-migration.

However, even in the bitter winter, those bleak plains are not quite destitute of bird-life. It is a most interesting study to observe how such tiny bodies weather the cold and storm. In bad storms, many birds come searching for food in the farm-yards and even flock into the towns; spring migrants overtaken by blizzards become especially familiar—song-sparrows, Zonotrichias, ovenbirds, thrushes, and many other birds come to the very doorstep or spend whole days in the barn; on such occasions, he must be a hard-hearted man who is not touched by their distress and delighted with their pretty, confiding ways. It is very noticeable, too, that birds are more social among themselves in the winter season, and one cannot doubt that their misery during cold and storm is considerably alleviated by the presence and the constant calls of their fellows.

Prairie-hens, in cold weather, lie in flocks under the snow and are thus blanketed from the cold. This habit is strikingly analogous to that of the vegetation (2c).

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* Wilson, Alexander, *Loc. cit.*, under "Pinnated Grouse."

† See C. William Beebe, Geographic Variation in Birds, with Special Reference to the Effects of Humidity, Zoologica, vol. I, No. 1. Am. Mus. Nat. Hist., New York, 1907.

The paleness of plumage which is useful for concealment on the clay-colored plains of summer is still more necessary on the snowy plains of winter. Some of the winter birds have plumage predominantly white, as the snowy owl and the snowflake.

Bare earth, cleared of snow, is, however, necessary to the existence of all ground feeders. The methods of getting bare earth are strikingly different in the valleys and on the plain, because of the fact that snow settles in the former but is, to a considerable extent, swept off the latter (cf. 2c). The terrestrial birds of the valleys (Junco, Zonotrichia, etc.) do not stay in North Dakota through the winter when the valleys are clogged with snow; after their return in the spring, if overtaken by a blizzard, they seek the most sheltered situations and there, if they do not find bare earth, industriously scratch away the snow. Terrestrial birds of the plains (larks, longspurs, snowflakes, all of which breed farther north) do remain in Dakota through the winter; during a blizzard it is obviously impossible for them to scratch away the snow, hence they seek the most exposed situations, where the soil is swept bare by the wind. Nothing can inspire a man with more fortitude to endure the Dakotan winter than to go out in a blizzard and see these tiny birds, flocking on the most exposed situations, busily searching the frozen earth for food, and, with their cheery little notes, making the winter merry.

4. ADAPTATIONS IN MAMMALIAN-LIFE.

The adaptations to plains life in the mammals are analogous to those in the birds. Hence I shall mention here only those points which are obscure or not generally known. The reader will find other details in the accompanying table.*

(4a) *Flatness.* Great locomotor activity, migration, and aggregation in large companies characterize the mammals as well as the birds of the plain. With regard to locomotion there is, however, this difference; powerful flight in a bird, as has already been noted (3a), makes the bird independent of any particular type of topography; but the locomotion of a mammal is specialized for one sort of country. Forest mammals excel those of the plains in surmounting obstacles and traversing rough country; plains mammals excel those of the forest in sheer speed upon a level tract.

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* From this point onward many details that are not mentioned in the text are given in the table.

The large hoofed mammals, which most strikingly illustrate these principles, are now, unfortunately, almost exterminated, and one must be content with a second-hand knowledge of them. The bison (less correctly called the buffalo) is one of the most characteristic products of the plains; and we are told that "The gait of the buffalo is at all times more active than that of other oxen. Not only is the walk brisk, but the trot and gallop enable him to cover the ground very rapidly. For a mile or so he is a good match for a horse." Also, the bison is "more sociable in his habits than any of his immediate relatives."* Migrations were performed on an extensive scale in the years of the bison's abundance. The pronghorn, another characteristic plains type, its original range having been precisely co-extensive with the plains, was likewise gregarious and somewhat migratory.† In its long course of evolution on the plains, the pronghorn has gained the fleetest foot on the American continent; but it has so completely lost the power of jumping over obstacles that the Indians captured it in numbers by corralling the herds within a slight brushwood fence.‡ The same prairie which developed the bison and the pronghorn developed to a similar state of specialization another hoofed animal, which, in recent geologic time, changed its residence from America to the Old World. There its unexcelled speed and endurance and its social tractable disposition made it the useful slave of mankind. Upon the discovery of America it was brought back to this continent and speedily restocked its ancestral prairies. Need I tell my readers that this animal was the horse?

With regard to the formation of large societies, one of the most characteristic animals of the plains is the prairie-dog. This little rodent has been known to form "towns" containing millions of individuals; one such town has a length of about a hundred miles.§ The existence of such a prairie-dog town is obviously dependent upon an equally extensive plant-association.

(4) *Aridity.* As can be seen by a glance at section 4b in the table, the prairie mammals, as well as the prairie birds, have followed the prairie plants in their subsidence into the ground.

Large mammals are necessarily ground feeders. Tall trees, though they favor large animals with shade and concealment, are a great detriment to the food supply. The deer of the forest are largely dependent for food upon the breaches in the forest—the fields and pastures cleared by man, the second-growth in burned areas and wind-falls, the herbs of the swamps, lake margins, and river-banks. In some parts of the forest, where the trees are tall and there is no undergrowth, even a giraffe would starve. Now, the bison is the antithesis of the giraffe. The bison, with its ponderous body raised but a short space above the ground, and with its ponderous head incapable of elevation, shows the extreme of inaptitude for browsing, and the extreme adaptation for grazing. The tremendous weight of this animal, together with the enormous numbers* with which it once stocked the prairie, is a tribute to the concentrated richness of the prairie flora (2b).

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* R. Ramsey Wright, in the Riverside Natural History, vol. V, pp. 317-318. Houghton, Mifflin & Co., 1888.

† *Ibid.*, p. 335.

‡ Herrick, Mammals of Minnesota. Geol. & Nat. Hist. Surv. of Minn., Bull. No. 7, 1892, p. 288.

§ Hornaday, The American Natural History, p. 77.

The rodents have followed the subsiding flora not merely to the surface of the soil, but into its depths; they have become not only terrestrial but fossorial. Squirrels in the East are tree squirrels, they feed on nuts, and nest in the branches; squirrels of the plains are ground-squirrels, they feed on grain, and nest in burrows. The extreme transmutation, however, is seen in the pocket gopher,† which, feeding upon the copious roots and tubers of the prairie, has become almost as completely subterranean as the mole, and almost as completely transformed in external form and internal structure. In hard and root-bound soil, such as characterizes the prairie, the pocket gopher is even more capable of burrowing than the mole, for its fore-claws are more powerful, and it has enormous incisors with which it digs as with a pickaxe. While these front teeth are digging the soil, the hind part of the mouth is kept closed and free from dirt by a special and unique formation of the lips. The animal's other adaptations to fossorial existence are too numerous to mention; suffice it to say that the pocket gopher, all told, is the consummate expression of the earthward tendency of the prairie biota.‡

Moles are absent from the plains; they could not find there the worms and soft grubs on which they feed, because for these worms and grubs the prairie sod is too dry.§ The degree of soil humidity necessary to the existence of such creatures is at so great a depth that they cannot live there. In this we see another illustration of the downward displacement of the prairie biota; the animals which constitute the lowest stratum of life in the forest have been pushed so far down in the prairie that they have been ruled out of existence altogther.

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* W. T. Hornaday, Extermination of the Am. Bison. Smithson. Rep., 1887, pp. 387-393.

† C. Hart Merriam, Monographic Revision of the Pocket Gophers. N. Am. Fauna No. 8. U. S. Dept. Agr., Washington, 1895.

Vernon Bailey, The Pocket Gophers of the United States. U. S. Dept. Agr., Washington, 1895.

Ernest Seton-Thompson, in Century Magazine, vol. 68, pp. 300-307.

‡ Biota-fauna and flora, or all the life of a given region.

§ F. W. True, A Revision of the Am. Moles, Publication No. 1101, Smithsonian Institution, Washington, 1896, p. 12.

In contrast to the mole, the pocket gopher can subsist in a very dry soil. It can live without drinking; indeed, so far as is known, it is incapable of drinking.* It finds no inconvenience in obtaining all the water necessary to its existence from its vegetable food. This gift is common to many vegetable feeders, including the hare and the prairie-dog. † Livingstone‡ tells us that in the Kalahari desert elands, steinbuck, gemsbuck, and ostriches live for months together without drinking. It would be interesting to determine for how many days our pronghorn§ habitually goes without water.

(4c.) *Severe Winter.* The effects of the severe winter upon mammals are easily understood from the table. I wish to add only two interesting facts about winter coats. The first is, that horses brought to Dakota from the South (I quote those who have tried the experiment) grow in the Dakotan winter a dense and rough coat such as they never possessed before. The second is, that the bison's hair is so ordered in its shedding and growing that in June its skin is almost bare, and early in the winter following, the new coat is in its prime—long, dense, and silky. The hardiness of the bison in cold and storm far surpasses that of all our domestic animals.

5. ADAPTATIONS IN INDIAN-LIFE.‖

(5a, b, c.) The vast, level, easily travelled configuration of the plain, and the immense herds of bison (4b), were the two overwhelmingly predominant facts in the environment of the plains Indian. The first, by allowing ceaseless friction between tribe and tribe, made the Indian a warrior; the second, by offering an ever-present store of food and clothing, made him a hunter; both together made him a nomad, following the herds of bison in their migrations across the vast plain. "Of all the great stocks south of the Arctic," says McGee,[*] "the Siouan was probably least given to agriculture, most influenced by hunting, and most addicted to warfare." No doubt these traits existed in the Dakota,[†] though in an inferior degree, before his settlement upon the prairie; no doubt they were the cause of his choosing the prairie for his home (and this again shows the intimate relation between the Siouan Indian and the prairie habitat), but when settled on the prairie he was prevented from passing beyond the hunting-fighting stage. Progress beyond this stage can only occur within the protection of great natural barriers, barriers of mountains, or wilderness, or waters. The plains afforded no barriers whatever; hence, the plains Indian was ever surrounded by enemies, ever prepared for war, ever ready to move, not impeded with growing crops, but dependent instead upon wild meat.[‡]

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* Herrick, *Loc. cit.*, p. 229.

† Hornaday, The American Natural History, Scribner's, 1904, p. 77.

‡ David Livingstone, *Loc. cit.*, p. 64.

§ See Ramsay Wright, *Loc. cit.*, p. 335.

‖ My information regarding the plains Indians is derived chiefly from the following sources:

O. T. Mason, Influence of Environment upon Human Industries or Arts, Pub. No. 1060, Smithsonian Institution, Washington, 1896.

W. J. McGee, The Siouan Indians, 15th Ann. Rep. Bureau Ethnology, pp. 153–204. Washington, 1897.

J. O. Dorsey, A Study of Siouan Cults, 11th do., pp. 351–544. Washington, 1894.

N. S. Shaler, Nature and Man in America, Scribner's, 1891.

Since the prairie determined these major occupations, it controlled the whole existence and mode of life of the plains-Indian. I shall bring together facts and quotations to show the profound influence of plains-life upon the Dakota's physical characteristics, his games, his religion, his social organization, his language.

The influence upon physical characteristics is concisely set forth by McGee.[§] He says, "The vigorous avocations of the chase and war were reflected in fine stature, broad and deep chests, strong and clean limbs and sound constitution." The Dakota is the prototype of that august figure which appears in the mind of the average man whenever he thinks of the "American Indian," a figure which is erroneously ascribed to the whole American race. It is true that the plains Indian did not turn out his toes, and this has been imputed to him as a fault; but in truth it is part of his perfect adaptation to life on the vast plains, for feet-parallel is the attitude of the great runner whereas the out-toed position characterizes those who habitually stand still.

The games of the Siouan boys were mimic hunts and sham battles; the pastimes of the adults were games of chance, reflecting their precarious mode of life. The temperament of the Siouan was the stoic. His religious ordeals[‖] were most cruel and bloody. His religious ceremonies were replete with images, skins, and skulls of the American Bison. His heaven was awarded to the brave warrior and the skilful hunter.[¶]

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[*] 15th Rep. Bureau Ethnology.

[†] The Dakota is a major branch of the Siouan stock.

[‡] Shaler, *Loc. cit.*, pp. 168–173, 181–187.

[§] McGee, *Loc. cit.*, p. 185.

[‖] Dorsey, *Ibid.*, especially pp. 450–463.

[¶] *Ibid.* (Dorsey), p. 422.

The discipline which is indispensable in any body of fighting-men, gave rise to a most elaborate social organization; a complex hierarchy was maintained, with the aid of a strict and ceremonious etiquette. And since each military organization on the continuous plain might easily become crippled by defections or strengthened by alliances, the Dakota became a tactful diplomatist, a skilful reader of human nature, and, through the practice of dissimulation, a consummate actor.

"The tongues of the plains, which have been most extensively studied, are notably melodious. . . . The high phonetic development of the Siouan tongues reflects the needs and records the history of the hunter and warrior tribes, whose phonetic symbols were necessarily so differentiated as to be intelligible in whisper, oratory, and war-cry, as well as in ordinary converse."* Some of these melodious vocables, such as Wahpeton, Dakota, Iowa, have, fortunately, been given a permanent position in the nomenclature of the plains.

The dramatic and oratorical powers of the Dakota led, in conjunction with certain other factors, to the development of a wonderfully complete and efficient sign language. The warlike habit of these Indians favoured the development of sign-language by retarding the development of graphic language. The facility of long-distance perception on the open plain must also be taken into consideration: a statement was made previously (p. 324) as to how much information an Indian could get even from a dust-cloud rising beyond the horizon; now, where the Indian's perceptive powers were so remarkably developed, and where he could, when he wished, be seen by his companions for miles in every direction, it is but natural that he should have evolved a code of signs, of which some at least could be seen and interpreted at long range. "This mode of conveying intelligence," says McGee, † "attained perhaps its highest development among some of the tribes of this [the Siouan] stock, who, with other plains Indians, developed pantomime and gesture into a surprisingly perfect art of expression adapted to the needs of huntsmen and warriors."

All these important characteristics of the Dakota are, then, bound up with the flatness of the plain and the abundance of the bison; and the abundance of the bison is, as we have seen (4b), dependent upon the prairie condition, which in turn is dependent upon aridity. It may be added that the roving disposition of the Indian is analogous to the proclivity to travel, in the plants, the birds, and the mammals;

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* McGee, *Loc. cit.*, p. 168.

† *Ibid.*, p. 168.

that the Indian's great social organization is analogous to the social organizations of the prairie birds and beasts; that his sign-language is due largely to the same fact of free space which has developed the soaring-song of the lark.

The numerous other facts given in column 5 of the table, facts which are too well-known to need explanation, refer chiefly to arts and industries, showing that these also are under the dominating influence of the flatness, the aridity, and the severe winter of the plains, and that they are analogous to certain facts in the bird-life and the mammalian-life of the region.

6. Adaptations in Pioneer-life.

(6a, b, c.) The romance of pioneering days on the plains—the months-long journeys, the battles with the Indians, the hunting of the bison, the immense herds of cattle, the stampedes, the wildness of cowboy life—has become so well-known through magazine articles, stories, and histories, that a description here would be a work of supererogation. I have endeavoured to show in the table that all the romantic features of pioneer-life on the plains may be referred to the same causes which have produced the wonders of the plant and animal life of the plains. If this be true, the romance of the plains has not passed away with the passing of the bison and the cowboy; it finds expression in every bird, every flower, every grass-blade on the prairie.

7. Adaptations in Civilization,

and

Review, showing the Analogies extending through Sections 2-7.

(7a.) *Flatness.* Civilization tends to bring all regions to the condition of the unobstructed plain. Though it was said in section 5 that early civilization requires great natural barriers to protect it from its barbarous neighbours, after the cradling stage is passed civilization is retarded by barriers and advances most rapidly where travel is easiest.* Civilized man is a plains-dweller; if compelled to live in a mountainous country, he reduces its unevenness by filling and grading, bridging and tunnelling; if compelled to pass through a forest, he converts part of the forest into a plain by removing the trees. Consequently, the ease of travel and communication which was in the natural state of the country confined to the plains regions has now been extended artificially over the greater part of the United States.

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* N. S. Shaler, *Loc. cit.*, pp. 168–173.

Nevertheless, the plains still maintain and always shall maintain a superiority in this respect. The plains are distinguished by excellent wagon-roads, which scarcely need to be paved, and by railroads which run for hundreds of miles with practically no curves and no grades. These are adaptations to the easily travelled surface of the country, and, as such, they are analogous to all those adaptations to the traversability of the plains which were mentioned in preceding sections; namely, the "prairie-schooner" of the pioneers (think how soon a "prairie-schooner" would come to grief in a rough, forested country); the Indian's nomadic habits, his burden-bearing dogs, and his travail; the tirelessness of the coyote and the swiftness of the pronghorn; the far flight of the longspurs and the cursorial habits of the prairie-hen. Finally, the tumbleweed, rolling along the level plain, is strikingly similar to the car-wheel rolling along the rail.

The traversability and the uniformity of the plains facilitate social aggregation and organization. The result is seen first in the very extensive plant associations; these impress us by the enormous numbers of individual plants which they include, and by their vast continuity, though they show but little of that mutual aid and organization which characterize a society in the sociologist's sense of the word. The myriad flocks of prairie birds show more of mutual aid and organization. The enormous herds of bison show, in some respects, still more. In the society of the plains Indians, it is the organization that attracts our attention, the number of individuals being but moderate. In the society of civilized man on the plains, the same is true: North Dakota contains but a moderate number of people, but these people show a geographic unity, a social solidarity, and a political discipline which they could not possibly show if they were not in a plains country. The immense farms and cattle ranches are a conspicuous result of geographic unity in the realm of economics. The same condition manifests itself in the realms of society and politics. The fact that every man on the plain is in full view of all his neighbours all of the time develops in him a strong social sense. The absence of mountain or forest retreats makes it difficult for any man to make an exception of himself. The uniformity of conditions throughout the entire State makes it possible for people from every section of the State to act together in harmony. A complete description of the consequences of these conditions would transcend the limits of this paper. But any one who has lived some years in North Dakota, and other years in regions of mountainous or diversified topography, must have observed for himself that the conditions in North Dakota are highly favourable to political and social organization of the people.

The broad and open view which surrounds every house in North Dakota becomes an object of the sincere affection of the prairie-dweller. If one who has lived for many years on the prairie travels to a hilly, forested, or urban region, he longs to return to where the horizon is a perfect circle, where the whole sky is always in view, and where a man can watch the goings and comings of his neighbours for miles in every direction. Thus we see that even the civilized man is strongly affected by that tendency to long-distance perception which, as we have seen, characterizes the plains Indians (p. 324), the plains mammals, and the birds that sing on the wing.

(7b.) *Aridity.* It was said in section 4b that large mammals are necessarily ground-feeders, and that for this reason the low, rich herbage of the prairie is the vegetation best suited to maintain large mammals in quantity. In this respect, man resembles the other large mammals. A dense population could never be fed in a forest. True it is that certain trees and vines are cultivated for their fruit; but the trees are purposely dwarfed, and the vines are trailed on fences or on the ground; moreover, all the trees in the world would make but a poor showing when contrasted, in the statistics of food-supply, with the combined product of all the herbs and grasses. Civilized man has destroyed the trees and drained the soil over immense areas of forest land in order to make room for an artificial condition closely resembling the natural condition of the prairie. This artificial prairie is devoted to the production of a great variety of herbs and a few invaluable forms of grass—pasture, hay, maize, barley, rye, oats, and wheat. Nevertheless, the natural prairie region still maintains a certain superiority in the quality of its food-roots, grass, and grain.

That subsidence into the ground which was exemplified by the great root-development among plants, and by the terrestrial habits of birds and mammals, finds an analogue in the earth lodge of the plains Indians and the "dugout" of the early settler. A little thought shows that the artesian wells of civilization are another analogue; just as the alfalfa plant, because water is scanty at the surface, bores for it even to a depth of 120 feet, so the human species, because water is scanty at the surface, bores for it even to a depth of 1,200 feet.

(7c.) *Severe Winter.* The analogies between the winter adaptations of the various types of life are interesting, and, in some cases, remarkably complete. These, I think, are perfectly clear and obvious in the table, with the exception of two which I shall briefly explain.

The contrast between the valleys and the plain, which obtains in so many respects, is not least interesting in respect of the distribution of snow. Men who live in the valleys, where the drifting snow settles down, find it necessary to dig away the deposit after every storm; but those who live on the windy plain find it much better to arrange houses, roads, and wind-breaks in such a manner that the wind will do the snow-sweeping. This contrast in the methods of obtaining clear ground is the same as we found in the birds (3c.), the ground-birds of the valley scratching away the snow, the ground-birds of the plain seeking spots swept bare by the wind.

Another close analogy between men and birds is seen in an increased sociality in winter. The wagoner who is overtaken by a furious blizzard must needs stop at the first house and ask (he needs to ask but once) for shelter for his horses and himself. So the birds, when overtaken by the blizzard, come to our houses and ask, in their pretty way, for shelter.

I wish to call attention, finally, to an analogy between two prairie products which depend upon the flatness of the surface and the richness of the herbage combined, and which could not therefore be classed under either (a) or (b). The first of these is the modern reaping-machine. As the North Dakota farmer watches one of these almost human machines passing across a field of wheat and every moment converting a patch of standing grain into a cut and tied bundle, he reflects with pride that if it had not been for the flat surface and the rich grain of the prairie regions, man would not now have had this wonderful servant, the self-binder. His pride might well be multiplied a myriad-fold by the reflection that if it had not been for the same flat surface and the same richness of vegetation on the prairie, man would never have had that most indispensable and most wonderfully perfect of all his servants—the horse.

CONCLUSION.

Now, enough has been said to show the truth of the statement made in the beginning, that those very features of North Dakota which are most unattractive to a newcomer—the flatness, the barren appearance, and the severe winter—are the causes, or the concomitants, of many interesting peculiarities, including much that is artistically beautiful and much that is scientifically fascinating.

NORTH DAKOTA LIFE: TABLE SHOWING THE ANALOGIES

CONDITIONS AND	→ ADAPTATIONS →		
1. ATMOSPHERIC APPEARANCES.	2. PLANT-LIFE.	3. BIRD-LIFE.	4. MAMMALIAN-LI
a. Flatness — traversability →	Seeds travel . . . . — carried by wind. — rolled along ground.	. . { good runners } . . . . . { good fliers }	good runners . . . . — coyote, hare, etc.
		— migration	— migration
	extensive associations	. immense flocks	immense herds . . . — prairie dog towns,
— visibility of all objects →	→	{ singing on the wing, seen and heard for long distance . .	. . perceive enemies lon
b. Aridity. — valleys more moist	Reduction of aerial surface		
	— plains treeless →	terrestrial on plains	terrestrial on plains .
	— trees in valleys →	arboreal in valleys	tree-squirrels in valleys
	— concentration } — near the ground } → — nutritious }	→	quantity of bison —
	— subterranean extension . . (great roots)	. . burrow in ground . . .	. . burrow in ground (prairie-dog, ground-squi
	drought-resistant . . . . spines, thorns ←	← live without drinking . . .	. live without drinking — obtain water from pl
	light color	light color	light color
c. Severe Winter plains swept bare, in spots valleys, deep snow.	Reduction of aerial surface — plains treeless — valleys with trees	seek wind-swept spots . . . dig away snow. (in valleys)	. . seek wind-swept sp dig away snow . .
	— subterranean (die to ground)	. . . . burrowing (owl) . .	. . burrowing . . .
	almost complete suspension of life	. . . . migration	. . . migration, hiber
	hairy covering		fur
		increased sociality	herds keep each other v
snow { →	→	white color	white color (wolf, hare)
snow { →	→	snow-shoe-like foot of grouse	. . . .

Dotted line . . . . or a single dot, thus } . { indicates the relation of analogy.

Arrow ————→ indicates relation of (probable) cause-and-effect, and leads from the cause to the effect.

The numbers, 1 to 7, and letters, *a*, *b*, and *c*, are used also in the text, dividing the text into sections to correspond wi

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FE.	5. INDIAN-LIFE.	6. PIONEER-LIFE.	7. CIVILIZATION.
. . . .	rovers, warriors, hunters, not farmers — travail (primitive vehicle) — fight in open; use horses — effects, athletics, ceremonial, religious — migration	rovers . . . . — "prairie schooner" fight Indians in open	railroads without grades or curves. good roads. perfection of farm-machinery.
. . . .	great social organization	great herds of cattle and horses — boundless ranches — (cowboy life)	immense farms. caravans of harvesters. — social and political results.
g distance.	sign language perception at long distances	. . . . men insepara	bly attached to the "broad view."
. . . .	no birch-bark wood used only for tent-poles and furniture " fetched from Rocky Mts.	"buffalo chips" for fuel wood brought from distance	straw for fuel. wood brought from Minn., Ore., Wash.
	tents of skin, boats of skin, sinew-backed bow cordage of sinew and intestine	big-game hunting quantity of cattle	rich grazing concentrated kernel of wheat. — increasing population and wealth.
. . . . rrels, etc.)	. . . . . earth lodge	sod-house and dugout	deep wells (1200 feet). root-crops large.
. . . . nts	. . . .	carry water on journeys . . .	"dry" farming.
ots . . .	. . . .	. . . .	. arrange houses, etc., so that wind sweeps clear of snow.
. . .	. . . .	. . . .	. . dig away snow, in valleys
. . .	. earth lodge in winter	sod-house and dugout	. "bank" houses with earth
ation . .	. . . . migration	out-of-door work suspended traffic blocked	out-of-door work suspended. traffic blocked, schools closed.
	skin-clothing, skin-tailoring	fur clothing	furs and woollens industry.
varm	. . . .	hospitality during blizzards . . .	. . hospitality during blizzards.
. . . .	. . . . . snow-shoes	. . . . snow-shoes	. . . . skis

h the sections of this table.

Among the consequences of flatness, aridity, and severe winter, I have mentioned sunny skies by day, and wonderful stars by night; gorgeous sunsets; beautiful snow scenes; the curious compass plant; birds which soar at great height and pour forth their melodies from the sky; bison which astonish us by their ponderous bulk and their almost incredible numbers; Indians which reached the highest ideal of their savage and warlike existence; and pioneer white men whose romantic stories have become inseparably connected with the plains. But more impressive, to my mind, than all these isolated facts, is the deep-lying sympathy between the plants, the animals, and the men, that must all adapt themselves to the same hard conditions; the consequent similarity of behaviour in even the most diverse forms of life; and, finally, the extent to which the most wonderful products of plains civilization have been foreshadowed, and in some cases, I may say, even excelled by the work of the primeval inhabitants.

Let no one think that I have attempted an exhaustive study. A reader familiar with the prairies, on looking over the table which I have drawn up, will wish to add many an illustration here and there, and perhaps to add new columns and new sections. It is to be hoped that such readers will extend and modify the table wherever they see fit to do so; for my whole presentation is intended to be suggestive, not assertive. For this reason I have been content to include my entire scheme under seven headings, which, since they embrace but one class of physical phenomena, and several fractions of the biota, obviously do not cover the entire field. Even those groups of phenomena which are included are, after all, barely touched upon. In short, the study of the atmospheric appearances alone, or of the plants, or the birds, or the insects (which I have not touched at all), if such a study were undertaken by a settler on a North Dakota farm, would keep him interested and delighted through all the years of his natural life.

GEOGRAPHICAL RECORD.

AFRICA.

Disaster to an African Expedition.—The Duke of Mecklenburg, accompanied by a number of scientific experts, went to East Central Africa over a year ago to engage in surveys and zoological, geological, ethnographical, and other researches. Reaching Bukoba on the German coast of Victoria Nyanza on June 9, his party surveyed districts along the Kagera River, discovered a new tributary